Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1-14 (cancelled)

15. (Currently Amended) A computer implemented method of generating a hybrid grid applicable to a heterogeneous reservoir crossed by at least one geometric discontinuity of known geometry, in order to form a model representative of fluid flows in the reservoir in accordance with a defined numerical pattern, a structure of the reservoir being known a priori from available data acquired through in-situ measurements, analyses and/or interpretations of seismic images of the reservoir, comprising:

forming at least one first structured grid for gridding of at least one part of the reservoir;

forming at least one second structured grid for gridding of another part of the reservoir comprising the discontinuity;

forming at least one cavity between the at least one first structured grid and each of the at least one second structured grid with a sufficient size to allow formation of at least one unstructured grip providing transition between the structured grids;

forming each unstructured grid which provides transition by use of a power diagram and by imposing conformity of each unstructured grid providing the transition with walls of each cavity; and

generating the hybrid grid by combination of the at least one first structured grid, the at least one second structured grid and the at least one unstructured transition grid.

16. (Previously Presented) A method as claimed in claim 15, wherein:

the at least one geometric discontinuity is a pipe or a well of known geometry crossing the reservoir, and a radial type grid is formed around each well or pipe, each cavity being defined around each second structured grid by deactivating grid cells of the at least one first structured grid.

17. (Previously Presented) A method as claimed in claim 15, wherein:

the at least one geometric discontinuity is a fracture or a fault crossing the heterogeneous reservoir and the at least one first structured grid and the at least one second structured grid are formed in parts of the heterogeneous reservoir, on either side of each fracture, by considering discontinuities thereof, each cavity including a unstructured transition grid formed by deactivating grid cells of the at least one first and second structured grids, on either side of each fracture.

18. (Previously Presented) A method as claimed in claim 16, wherein:

the at least one geometric discontinuity is a fracture or a fault crossing the heterogeneous reservoir and the at least one first structured grid and the at least one second structured grid are formed in parts of the heterogeneous reservoir, on either side of each fracture, by considering discontinuities thereof, each cavity including a unstructured transition grid formed by deactivating grid cells of the at least one first and second structured grids, on either side of each fracture.

19. (Previously Presented) A method as claimed in claim 15, comprising:

imposing polygonal edges forming of walls of each cavity to be edges of a Delaunay type triangulation.

20. (Previously Presented) A method as claimed in claim 16, comprising:

imposing polygonal edges forming the walls of each cavity to be edges of a Delaunay type triangulation.

21. (Previously Presented) A method as claimed in claim 17, comprising:

imposing polygonal edges forming the walls of each cavity to be edges of a Delaunay type triangulation.

22. (Previously Presented) A method as claimed in claim 18, comprising:

imposing polygonal edges forming the walls of each cavity to be edges of a Delaunay type triangulation.

23. (Currently Amended) A computer implemented method of simulating, in accordance with a defined numerical pattern, evolution of a process in a heterogeneous reservoir crossed by at least one geometric discontinuity of known geometry, a structure of the reservoir being known a priori from available data acquired through in-situ measurements, analyses and/or interpretations of seismic images of the reservoir, comprising:

forming at least one first structured grid for gridding of at least one part of the reservoir;

forming at least one second structured grid for gridding of another part of the reservoir comprising the discontinuity;

forming at least one cavity between the at least one first structured grid and each of the at least one second structured grid with a sufficient size to allow formation of at least one unstructured grip providing transition between the structured grids;

forming each one unstructured grid which provides transition by use of a power diagram and imposing conformity of each unstructured grid providing the transition with walls of each cavity;

generating the hybrid grid by combination of the at least one first structured grid, the at least one second structured grid and the at least one unstructured transition grid; and

solving a numerical pattern in the hybrid grid formed for the medium.

24. (Previously Presented) A method as claimed in claim 15, wherein: each first structured grid is a non-regular grid, of CPG type.

25. (Previously Presented) A method as claimed in claim 16, wherein: each first structured grid is a non-regular grid, of CPG type.

26. (Previously Presented) A method as claimed in claim 17, wherein: each first structured grid is a non-regular grid, of CPG type.

27. (Previously Presented) A method as claimed in claim 18, wherein: each first structured grid is a non-regular grid, of CPG type.

28. (Previously Presented) A method as claimed in claim 19, wherein: each first structured grid is a non-regular grid, of CPG type.

29. (Previously Presented) A method as claimed in claim 20, wherein: each first structured grid is a non-regular grid, of CPG type.

30. (Previously Presented) A method as claimed in claim 21, wherein: each first structured grid is a non-regular grid, of CPG type.

31. (Previously Presented) A method as claimed in claim 22, wherein: each first structured grid is a non-regular grid, of CPG type.

32. (Previously Presented) A method as claimed in claim 23, wherein: each first structured grid is a non-regular grid, of CPG type.

33. (Previously Presented) A method in accordance with claim 23, wherein: the evolution of the process involves fluid flows.

34. (Previously Presented) A method in accordance with claim 24, wherein: the evolution of the process involves fluid flows.